

PATENT Ser. No. 09/574,955

Listing of Claims:

1. (Canceled) A method of guiding one or more non-atomic particles confined inside a laser beam, the method comprising confining the particles inside the laser beam and directing the laser beam into a hollow portion of an optical fiber, wherein the particles confined inside the laser beam are guided by the laser beam propagating inside the hollow portion.

2. (Canceled) The method of Claim 1, further comprising providing a source of the particles before confining the particles inside the laser beam.

3. (Canceled) The method of Claim 1, further comprising an optical system for focusing the laser beam before confining the particles inside the beam.

4. (Canceled) The method of Claim 1, wherein directing the laser beam into the hollow portion of the optical fiber comprises directing the beam into a through channel of an optical fiber.

5. (Canceled) The method of Claim 1, wherein directing the laser beam comprises coupling the beam into the hollow portion in such a way that the beam propagates along the hollow portion substantially along a longitudinal axis of the optical fiber.

6. (Canceled) The method of Claim 1, wherein the hollow portion is filled with a gas or a liquid.

7. (Canceled) The method of Claim 1, wherein one or more particles are liquid or solid.

PATENT Ser. N . 09/574,955

8. (Canceled) The method of Claim 1, wherein one or more particles are made of one material.

9. (Canceled) The method of Claim 1, wherein one or more particles are made of two or more materials.

10. (Canceled) The method of Claim 1, wherein a linear size of the particles is about 10 nm or larger.

11. (Canceled) A method of depositing a particle onto a substrate, the method comprising:
confining the particle inside a laser beam, the particle having a dimension
larger than a wavelength of the laser beam;
directing the laser beam into a through channel of an optical fiber;
transporting the particle through the channel by causing the laser beam
to propagate along the channel; and
causing the laser beam to exit the through channel and deposit the
particle onto the substrate.

12. (Canceled) The method of Claim 11, further comprising providing a source generating the
particle to be deposited onto the substrate.

13. (Canceled) The method of Claim 11, further comprising depositing a plurality of particles of
one material onto the substrate.

PATENT Ser. N . 09/574,965

14. (Canceled) The method of Claim 13, further comprising moving the substrate to allow deposition of the particles onto different spots on the substrate.

15. (Canceled) The method of Claim 11, wherein causing the laser beam to exit the through channel and deposit the particle onto the substrate comprises depositing the particle onto a predetermined spot on the substrate.

16. (Original) The method of depositing a material onto a substrate, the method comprising:
providing a solution containing the material;
transforming at least a portion of the solution into a plurality of non-atomic droplets of the material near a first opening of an optical conductor having a through channel;
confining the droplets inside a laser beam while directing the beam toward the first opening;
transporting the droplets inside the through channel from the first opening to a second opening of the optical conductor by causing the laser beam with the confined droplets to propagate between the first and the second openings in the through channel; and
depositing the droplets of the material onto the substrate after the laser beam exits the second opening of the optical conductor.

17. (Original) The method of Claim 16, wherein the substrate is selected from the group consisting of metals, alloys, insulators, semiconductors, polymers, and biological material.

18. (Original) The method of Claim 16, wherein the material is selected from the group consisting of metals, alloys, dielectrics, semiconductors, liquids and biological material.

PATENT Ser. No. 09/574,955

19. (Previously presented) The method of Claim 16, wherein the droplet size is larger than about 10nm.

20. (Currently amended) A method for depositing a material onto a substrate, the method comprising:

providing one or more particles comprising providing one or more liquid droplets;

confining one or more particles inside a laser beam while directing the beam

toward a first opening;

transporting one or more particles inside the through channel from the first opening to a second opening of the optical fiber by causing the laser beam with the confined one or more particles to propagate between the first and the second opening to a second opening of the optical fiber by causing the laser beam with the confined one or more particles to propagate between the first and the second openings in the through channel;

treating one or more particles while transporting them inside the through channel, thereby providing the material for deposition; and

depositing the material onto the substrate after the laser beam exits the second opening of the optical fiber.

21. (Original) The method of Claim 20, wherein treating one or more particles comprises chemical or thermal treatment.

22. (Canceled) The method of Claim 20, wherein providing one or more particles comprises providing one or more liquid droplets.

PATENT Ser. No. 09/574,955

23. (Currently amended) The method of Claim 22 20, wherein providing one or more liquid droplets comprises providing a solution by dissolving the material in a solvent; and transforming the solvent into one or more liquid droplets.

24. (Original) The method of Claim 20, wherein one or more particles are larger than about 10 nm in size or 10^{-21} liters in volume.

25. (Original) The method of Claim 20, wherein one or more particles comprises a liquid portion and a solid portion.

26. (Previously presented) The method of Claim 25, wherein the solid portion is the material deposited onto the substrate.

27. (Previously presented) A method of confining a particle inside a through channel of an optical fiber, the method comprising:

directing a first laser beam into the channel through a first opening of the optical fiber;

directing a second laser beam into the channel through a second opening of the optical fiber; and

confining the particle inside the channel by causing the first and the second laser beams to propagate toward each other inside the channel.

PATENT S. No. 09/574,955

28. (Original) The method of Claim 27, wherein the optical conductor is horizontal and wherein the first and the second openings are disposed opposite to each other.

29. (Original) The method of Claim 27, further comprising changing an intensity of both of the laser beam or changing an intensity of one of the laser beams to change a position of the confined particle inside the channel.

30. (Previously presented) A method of confining a particle inside a hollow portion of a optical fiber, the method comprising:

confining the particle inside a laser beam;

directing the laser beam with the confined particle into the hollow portion through a first opening of the optical fiber; and

transporting the particle inside the hollow portion by causing the laser beam to propagate inside the hollow portion until a velocity of the particle reduces to about zero.

31. (Previously presented) The method of Claim 30, wherein the optical fiber is substantially vertical.

32. (Currently amended) The method of Claim 20 30, further comprising causing the laser beam to exit the optical fiber through a second opening.

PATENT Ser. No. 09/574,955

33. (Canceled) An apparatus for guiding one or more particles inside a hollow portion of an optical fiber, the apparatus comprising:

the optical fiber having a first opening; and

a laser beam capable of entering the hollow portion of the optical fiber through the first opening and propagating inside the hollow portion while guiding one or more particles confined inside the laser beam, the size of one or more particles being larger than an atomic size.

34. (Canceled) The apparatus of Claim 33, further comprising a source providing one or more particles.

35. (Canceled) The apparatus of Claim 33, further providing an optical system for focusing the laser beam.

36. (Canceled) The apparatus of Claim 33, wherein the laser beam exits the optical fiber through a second opening.

37. (Canceled) The apparatus of Claim 33, wherein the hollow portion is a through channel.

38. (Canceled) The apparatus of Claim 33, wherein the hollow portion is filled with a liquid or gaseous medium.

PATENT Ser. No. 09/574,955

39. (Canceled) An apparatus for deposition one or more particles onto a substrate, the apparatus comprising:

an optical fiber having a through channel;

a laser beam capable of entering the channel through a first opening and propagating inside the channel while guiding one or more particles confined inside the laser beam; and

the substrate disposed to allow the laser beam exiting the channel through a second opening to contact the substrate.

40. (Canceled) The apparatus of Claim 39, wherein the first and the second openings are located at the two opposite ends of the optical fiber.

41. (Canceled) The apparatus of Claim 39, wherein one or more particles are larger than about 10 nm in size or 10^{-21} liters in volume.

42. (Canceled) The apparatus of Claim 39, wherein the substrate comprises a plurality of locations onto which the particles can be deposited.